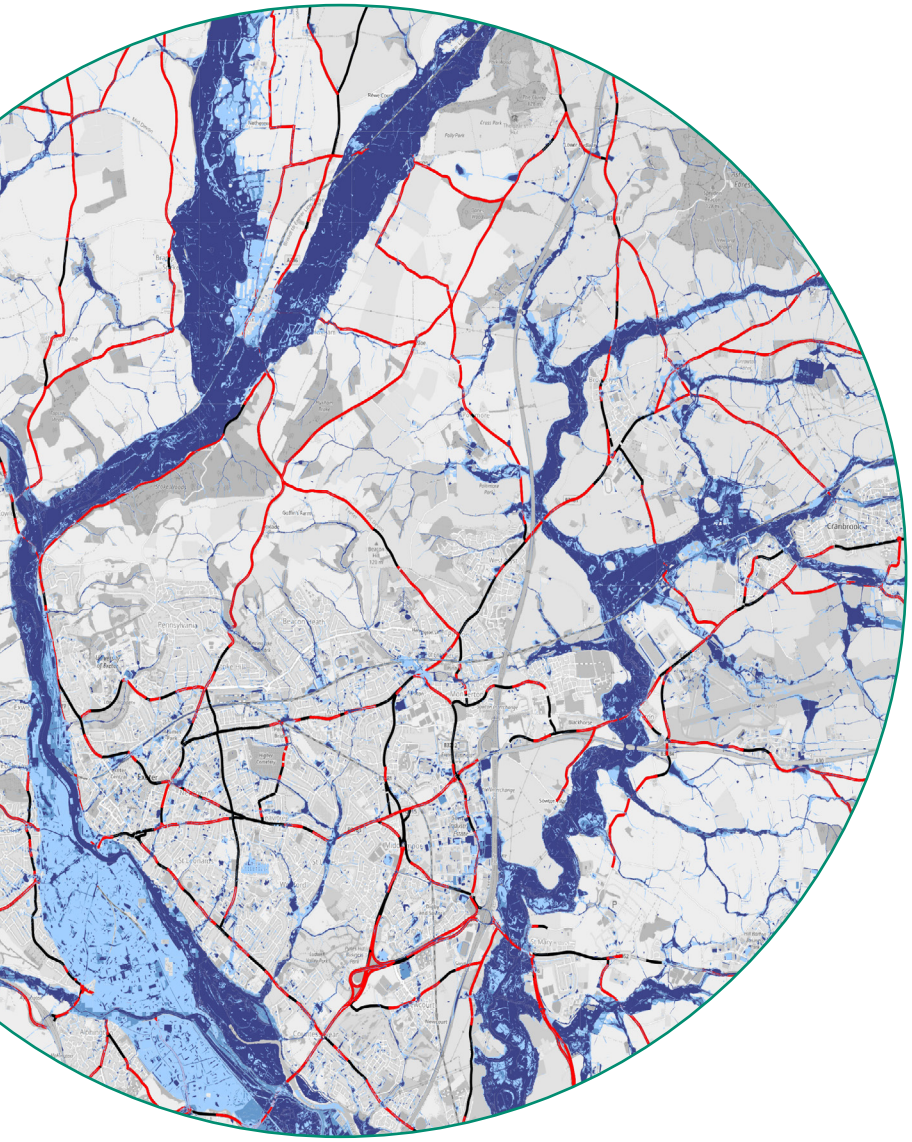

Annual Report 2025

Centre for Energy and the Environment

Introduction

About SWEEG

The South West Energy and Environment Group (SWEEG) is a collaborative research partnership between public sector organisations in the South West

The SWEEG partnership was formed in the 1970s and continues to research and share information on energy, emissions and environmental issues in the built environment.

The Centre for Energy and the Environment at the University of Exeter coordinates and carries out technical research on behalf of SWEEG members. Research completed by the Centre is disseminated among SWEEG partners, while work of wider interest may be published in technical and academic journals.

A list of publications produced for SWEEG over the past year can be found at the end of this report. More information about the Centre and SWEEG research is available on the University of Exeter website at www.exeter.ac.uk/cee.

Current SWEEG members

Cornwall Council
Devon and Cornwall Police
Devon County Council
East Devon District Council
Exeter City Council
Mid Devon District Council
Plymouth City Council
South Hams District Council
Teignbridge District Council
West Devon Borough Council
University of Exeter

Organisations wishing to enquire about SWEEG or commission work from the Centre should contact:

The Centre for Energy and the Environment
University of Exeter
Hope Hall
Prince of Wales Road
Exeter EX4 4PL

Tel: 01392 724159
Web: www.exeter.ac.uk/cee

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Front cover
The increased risk of flooding (blue) caused by climate change threatens large portions of Devon's road network (red), adaptation is critical to minimise disruption.

About the Centre

The Centre for Energy and the Environment has been working with public sector organisations and businesses for over 45 years. Our research has a direct impact on environmental outcomes and policies.

The Centre for Energy and the Environment (the Centre) is a research group within the University of Exeter and is uniquely placed to provide high quality, bespoke research to help reduce energy consumption and carbon emissions.

2025 has marked a year of change for SWEEG and for the Centre. Cornwall Council has rejoined SWEEG and the Group now has more members than ever before. Ray Rubia Rankin returned to Scotland to pursue his career in ecology having successfully developed land-based expertise at the Centre. We wish Ray the very best for the future.

Tony Norton retired as Head of the Centre but has become a University of Exeter Associate and will maintain contact with the Centre. Tony was still a student at Exeter when SWEEG was formed and recalls a talk at the inaugural conference in 1978 where the concept of cumulative carbon dioxide emissions changing the climate was introduced. When he joined the Centre in 2004, climate change had yet to make an impact in public consciousness, but Al Gore's film 'An Inconvenient Truth', released in 2006, saw the extent and causes of the climate crisis become clear to many over the next couple of years, and in 2008 the UK Climate Change Act set the first legally binding targets for emissions reduction.

Tony has guided the Centre and SWEEG partners through austerity and Covid and over the last 20 years has overseen many important projects, leaving a lasting legacy of which he can be proud. The Centre developed one of the first local authority carbon descent strategies for Exeter in 2007 and, with input from the Centre, Montgomery Primary School in Exeter became the first zero carbon in-use Passivhaus school in the UK. Many of our buildings are designed with future climate change in mind thanks to research carried out at the Centre. Organisations and local communities now have a better understanding of their carbon footprints and have become empowered to develop action plans as a result.

Dan Lash has taken over as the new Head of the Centre bringing 20 years of knowledge and experience of working with the public sector. New challenges await Dan and the team as SWEEG approaches its 50th anniversary, including local authority reorganisation and the increasing pressures on university funding.

Tony and the team visited Den Brook wind farm this year.

Current Staff

Dan Lash Head of the Centre
Dan studied architecture and specialises in low energy building design including ventilation, lighting & comfort. Dan also leads the Centre's work on carbon footprinting.

Andrew Rowson Research Fellow
Andrew is an Engineering Mathematician with experience in construction. He is involved in strategic energy modelling, technologies, planning and policies.

Isabel Brown Research Assistant
Isabel's background is in climate change and has recently worked on transport decarbonisation, adaptation planning policy and solar resource mapping.

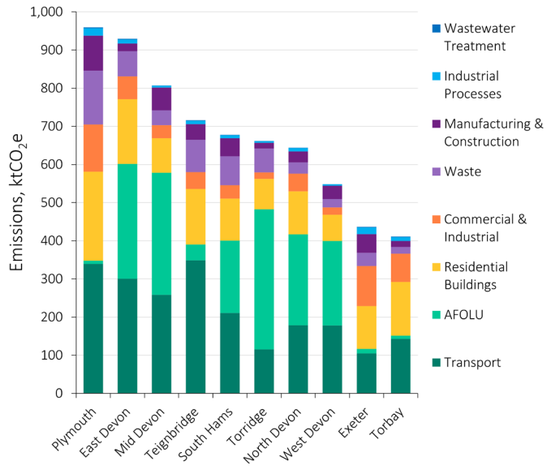
Ethan Feaver Research Assistant
Ethan is an environmental chemist with experience in pollution monitoring. His recent work has focused on the built environment, PV and energy storage technology

Territorial Footprinting

Local Authority Territorial Footprints

The Centre continues to support local authority Climate Emergency responses by providing annual updates to territorial carbon footprints and carbon descent progress reports.

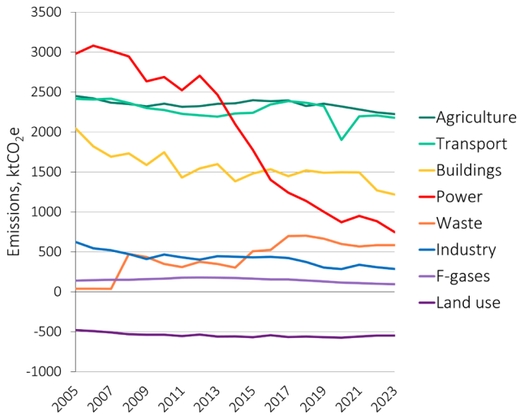
The Centre provides territorial footprints for Devon, Cornwall, district and unitary authorities. The analyses are derived from central government emissions datasets including transport and commercial energy use. Emissions from waste are determined using data from the National Atmospheric Emissions Inventory (NAEI) and South West Water which are based on individual disposal facilities rather than the waste arisings reported by government figures.



Territorial emissions in Devon districts, Plymouth and Torbay by sector in 2023. Emissions from AFOLU represent a large proportion of emissions outside the urban centres.

Emissions by sector vary considerably across Devon County and highlight differences between rural areas, where emissions from agriculture, forestry, and other land uses (AFOLU) dominate, and urban areas which see a larger proportion of emissions from domestic and non-domestic buildings.

Overall territorial emissions for Devon, Plymouth and Torbay in 2023 were 6,790 $ktCO_2e$ (excluding shipping and aviation) and continue to demonstrate a steady downward trajectory after a post-pandemic bounce back in 2021. Agriculture and transport continue to be the largest sources of emissions, although transport

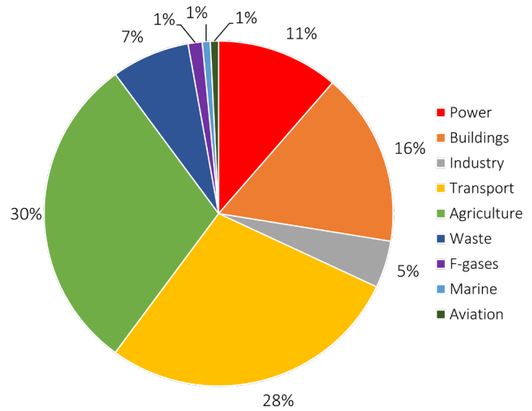


Total territorial GHG emissions in Devon, Plymouth and Torbay from 2005 to 2023. Major emissions reductions continue to come from the power sector.

emissions have resumed their downward trajectory, following post-pandemic behaviour changes in the workplace and increased uptake of EVs.

Emissions from buildings are falling steadily as heat pump uptake increases slowly but higher energy prices may also be a factor. More investment in long lasting energy efficiency and heat decarbonisation measures is needed to keep building emissions falling. The power sector has underpinned falls in emissions across the UK for many years through the increased penetration of renewables into grid electricity, and has resumed its downward trend after a small increase in 2021. Emissions from waste have been broadly stable since 2020 and there have only been small changes in industry and F-gas emissions. Increased deployment of heat pumps may see increases in fugitive F-gases.

Outside of the power sector, emissions reduction rates are falling below those required to meet local and national targets. In the 7th Carbon Budget the Climate Change Committee argues that efforts in transport and buildings must accelerate ahead of sectors such as agriculture, aviation and waste where decarbonisation is more challenging.



Devon territorial emissions by sector. Marine and aviation emissions comprise a small fraction of the total footprint.

The Centre has also revisited options for estimating emissions from aviation and shipping using data from shipping ports, fisheries and airports which account for around 1.5% of Devon's territorial footprint. These emissions have previously been excluded due to low confidence in the data.

Territorial footprinting provides a basis to measure progress towards net zero targets and the Devon Carbon Plan provides a roadmap for all authorities in Devon. The Centre has developed methods for 60 indicators to track progress over the range of sectors covered by the Devon Climate Emergency to expand the analysis beyond a carbon-only approach.

Indicators cover five broad categories. The 'Economy and Resources' category primarily focuses on improving recycling rates or reducing emissions from water treatment. Data from Defra for example show municipal recycling rates have plateaued at around 50%, some way from the 63% target for 2030. Other indicators track local sustainability schemes including banking and support for training in low carbon skills.

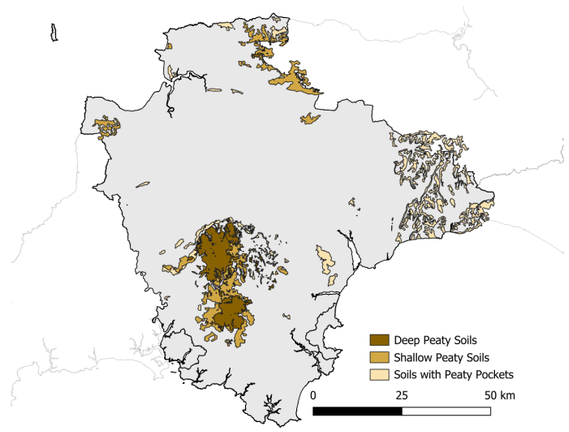
The 'Energy' category indicators follow renewable energy deployment and industrial carbon capture and storage through central and local government datasets. Targets for renewable heat represent a major challenge and considerable investment in heat pumps and skills training will be necessary to increase the share of renewables from 7% to 80% by 2030.

The 'Built Environment' includes 20 indicators focused on energy efficient retrofit and the roll-out of low carbon heating. Data from Energy Performance Certificates and government initiatives, such as the Boiler Upgrade Scheme provide the underlying data.

The 15 indicators in the 'Transport' category are tracking active travel measures, the transition away from private cars and the use of low carbon fuels in HGVs, rail and aircraft. Most indicators are drawn from Department for Transport data. There is a focus on the electrification of public transport and HGVs as well as charging infrastructure which will support individuals and businesses making decisions on the switch to electric vehicles.

The final category, 'Food, Land and Sea', includes 10 indicators covering agriculture and the natural environment. GIS analyses of important habitats (e.g. peatland) has been used, along with data from schemes such as the Sustainable Farming Initiative (SFI) which pay farmers for land stewardship. New applications to the SFI have since been suspended and new methods will be needed to track future progress.

Across the five categories, 50 quantitative indicators and seven qualitative indicators are recommended. The remaining three were found to lack data of sufficient quality to allow reliable monitoring. An initial review of progress against all the indicators shows that more work and targeted investment will be required for Devon to meet each milestone before the respective deadlines. The Centre will assist by recalculating and reviewing these indicators annually to track ongoing progress.



Peatland in Devon is an important carbon sink and efforts to restore and maintain these areas will ensure that carbon continues to accumulate in this natural store.

Organisational Footprinting

Carbon Footprinting for Local Authorities

The Centre produces organisational greenhouse gas inventories for Local Authorities and other partners which are updated annually. Analysis can include detailed carbon descent planning and engagement with staff across multiple departments.

The Centre has long produced organisational carbon footprints for several local authorities in the SWEEG partnership using the updated methodology outlined in last year's Annual Report. Devon County Council, East Devon, Exeter, South Hams, West Devon, Mid Devon, and Plymouth all make use of this service.

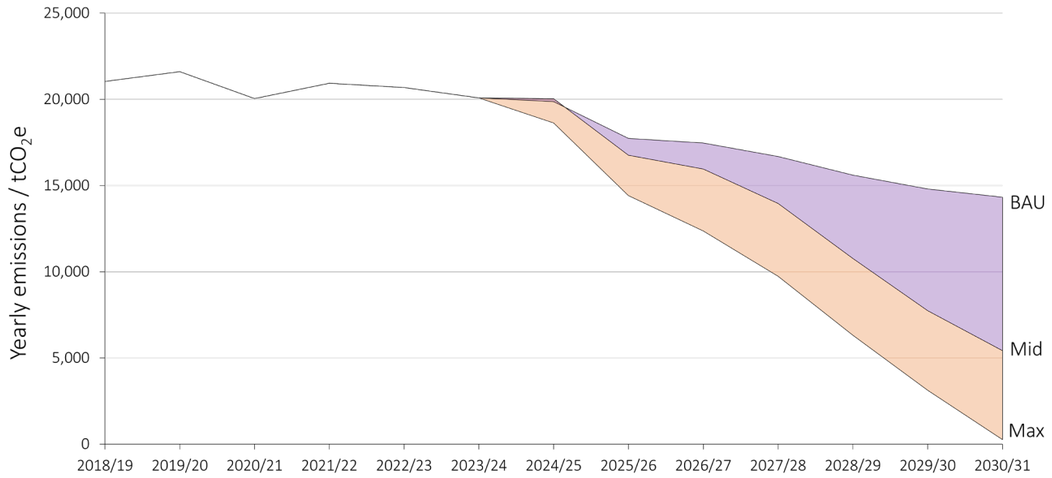
Carbon footprinting has also been undertaken for the five police forces operating in the South West, the Dartmoor National Park Authority and for Treveth Homes, a development company that works in close partnership with Cornwall Council.

The Centre has produced the Exeter City Council (ECC) GHG inventory for the past six years, and in 2022 assessed the emissions reduction potential in five sectors including council-owned housing, non-domestic buildings, transport, renewable energy and land use change/afforestation.

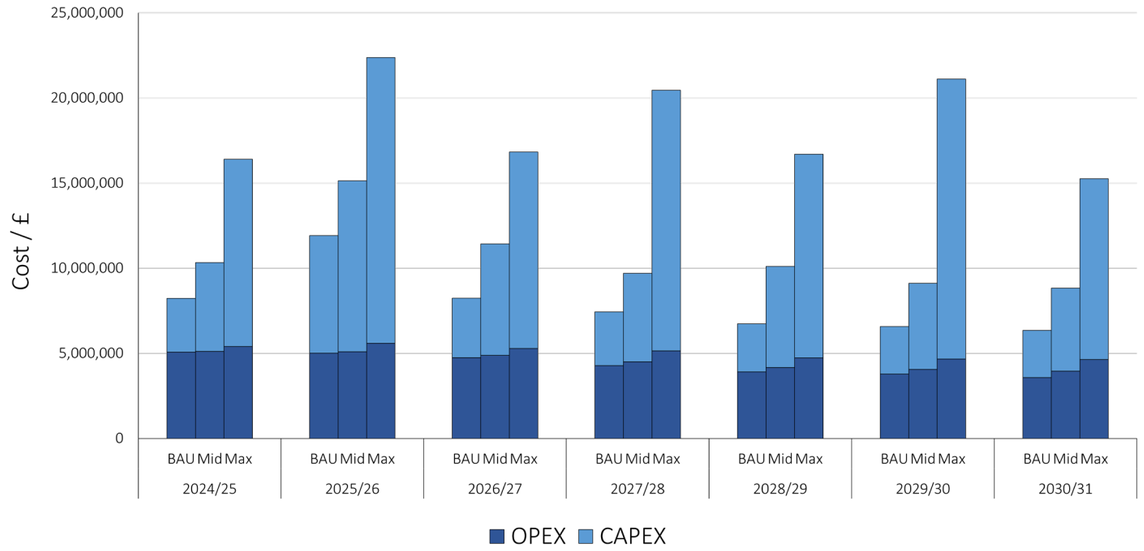
This year has seen work on the carbon descent plan updated and extended to include cost estimates to 2030. The analysis considered direct Scope 1 and Scope 2 activities but did not include Scope 3 supply chain costs. The assessment of Scope 3 emissions is currently characterised by poor data and a lack of robust methodologies and standards. The extended analysis includes costs to reach net zero by 2030 in three scenarios: Business as Usual (BAU), Mid Case (Mid) and Net Zero (Max).

The closure of sites with high energy use and limited scope for retrofit, such as the Civic Centre and Northbrook Pool, could help reduce the ECC organisational footprint.

The BAU scenario included existing and planned activities to which ECC is already committed. The Mid Case Scenario reflected an agreed escalation beyond BAU, a 'stretch' target but one that was considered achievable with additional government funding.



Projected ECC Scope 1 and 2 organisational emissions under the BAU, Mid and Max decarbonisation scenarios.



Annual capital and operating costs associated with decarbonising ECC assets under the three different scenarios between now and 2030/31. Spikes in CAPEX in the Max Scenarios is often due to costs associated with installing heat pumps.

The Net Zero (Max) scenario represented a theoretical maximum level of uptake of all measures without consideration of constraints such as cost, supply chain capacity or shortfalls in skills,

As an example, transport emissions are dominated by refuse collection vehicles (483 tCO_2e in 2023/24) and the BAU scenario assumed that the proportion of the electric fleet would stay as it is. Under the Mid scenario three additional RCVs are procured with the remaining diesel vehicles transitioning to Hydrotreated Vegetable Oil (HVO), a lower carbon 'drop-in' fuel, and increasing the blend by 20% annually to reach 100% in 2030. The Max scenario assumed the replacement of all diesel with HVO in 2025/26 and the replacement of all vehicles with an electric equivalent at the end of each lease.

The potential for Scope 1 and 2 emissions reductions involved a review of ECC documents and data, an appraisal of central government policies relevant to each sector, and discussions with ECC service leads and officers in related departments.

The capital and operational expenditure (CAPEX/ OPEX) associated with each set of measures was estimated to 2030. Where it was possible, OPEX was calculated using energy consumption and forward projections of fuel prices. Other sources of OPEX included leasing and maintenance, particularly in the transport sector where fleet vehicles tend to be leased.

Most CAPEX arises from improvements to social housing, and especially in the Max scenario where heat pumps replace gas boilers across the estate. Expenditure peaks in specific years where upgrades to non-domestic buildings such as the Riverside leisure centre and the Royal Albert Memorial Museum are anticipated.

Social housing represents 86% of the ECC footprint in 2023/24 so reaching net zero by 2030 will not be possible without addressing emissions from housing. These measures can be costly but there are potential co-benefits and opportunities for quick wins. Treating homes for example can improve health outcomes and fuel poverty while the electrification of transport can happen quickly with little additional CAPEX.

The current BAU trajectory is ambitious and will cost £55m by 2030/31, and while the Mid 'stretch' Scenario could cost an additional £19m, it falls 5 kt CO_2e short of net zero in 2030. Even with the central funding and a supportive policy environment it is likely that some offsetting will be required to meet the 2030 target.

Industrial Decarbonisation

Opportunities for Decarbonising Industrial Estates

A detailed study of energy use and emissions at the Heathfield Industrial Estate was undertaken to identify opportunities to decarbonise businesses and provide lessons for other non-domestic and industrial sites in Devon.

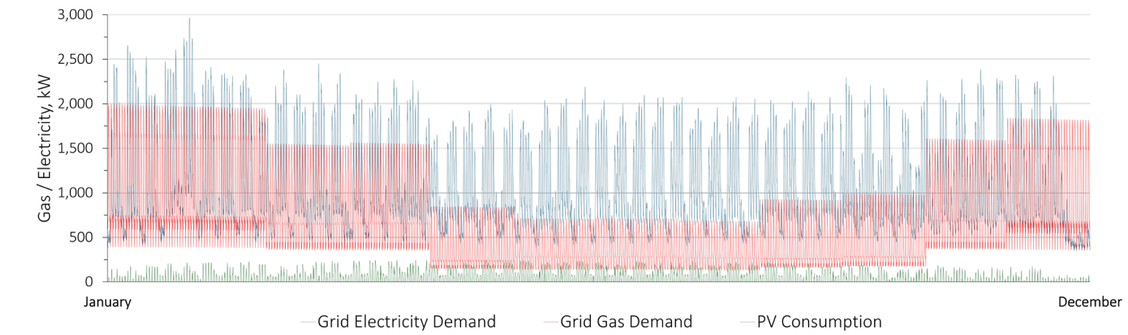
The Heathfield Industrial Estate near Bovey Tracey covers an area of 65 ha and is home to 191 businesses.

Devon County Council together with Teignbridge District Council and funding from the South West Net Zero Hub, commissioned the Centre to investigate the decarbonisation of non-domestic sites and industrial estates. Many of these businesses are SMEs and are often overlooked in wider industrial decarbonisation strategies. The Heathfield Industrial Estate (HIE) was originally selected due to an earlier study which mistakenly identified it as a high energy user.

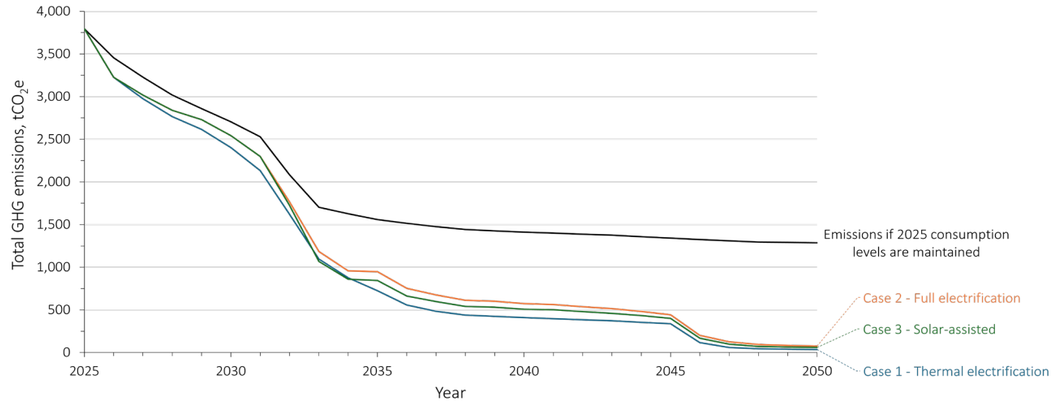
In Phase 1 of the project an external contractor was engaged to collect energy data and conduct energy audits for businesses across the estate and to provide costed options for emissions reduction measures. In Phase 2 the data was to be analysed at the Centre but poor rates of business engagement and missing/low quality data meant that an extensive energy modelling exercise was required. Hourly consumption for every business was pieced together from a range of sources including benchmark data, energy profiles and annual meter readings. Importantly, early engagement with National Grid Electricity Distribution (NGED) provided a means to verify modelling against substation data, not all of which is available in the public domain.

Grid electricity demand was calculated at 9.1 GWh with a peak load of 3.0 MW while existing rooftop PV was estimated to generate 623 MWh, approximately 60% of which is likely to be consumed on-site. Of the 9.6 GWh annual total, 80% of electricity on Heathfield was consumed by 20 businesses.

Data on gas use for businesses was limited and Wales and West Utilities (WWU) were unable to provide data at estate level so the annual demand of 5.9 GWh with a peak load of 2.0 MW was derived from modelling. The final profile (below) was derived using Distribution Future Energy Scenarios (DFES) from NGED and represents average demand between seasons, but is not necessarily a good substitute for annual hourly data. A small amount of oil use and F-gas emissions brought gross emissions top 3,842 tCO_2e (excluding transport), with existing PV able to offset around 4% of the total. Approximately 50% of emissions arose from three food manufacturers, and by focussing effort on the top 10% of businesses, emissions across the estate could be reduced to 25% of current levels.



Modelling hourly grid electricity (blue) alongside gas (red) and PV self-consumption (green) was challenging given shortfalls in the available data , but it provided the basis for developing the subsequent decarbonisation scenarios.



Decarbonising Heathfield through electrification in three cases, each of which approaches net zero by 2050. Electric vehicles and charging infrastructure support decarbonisation beyond the estate ,while expanding PV increases resilience and lowers energy bills.

Phase 3 of the project developed decarbonisation scenarios. For most businesses this meant electrifying fossil fuel heating, process loads and transport. Energy efficiency measures (lighting and heating controls) could deliver a 14% reduction in energy demand but the large proportion of unheated spaces and low space heating demand meant that fabric measures were unlikely to be cost effective. For similar reasons heat and hydrogen networks were not considered further. This finding is in accordance with recommendations in the Seventh Carbon Budget from the Climate Change Committee (CCC).

Three intervention cases were modelled to 2050 using trajectories from the CCC and DFES. Case 1 includes efficiency measures and electrified thermal loads, to which Case 2 adds demand for electric HGV and vehicle charging. Case 3 then adds PV to all available roof space. In Case 1, heat pumps eliminate gas consumption with a 10% increase in electricity demand, while energy efficiency reduces peak demand by 3%. In Case 2 electricity demand increases by 135% with a 171% rise in the peak load. In Case 3 additional PV capacity reduces grid electricity by 24% but only reduces the peak load by 7%.

In 2050, residual emissions of 32 tCO_2e, 76 tCO_2e and 56 tCO_2e arise from grid electricity in Cases 1, 2, and 3 respectively. Existing transport emissions are estimated at 8,371 tCO_2e, more than twice those from other activities. As most fuel is procured off-site, electrification supports wider decarbonisation goals.

Policy proposals such as a ban on sales of new gas boilers, grants supporting EVs and associated infrastructure, and the changes to the imbalance in environmental charges which are disproportionately levied on electricity, will eventually ease businesses towards electrification. On the basis of this study however, the economic benefits to businesses of reducing energy and emissions are insufficient to drive positive action in advance of these policy changes.

The final phase of the project considered the wider energy system and potential investment opportunities in storage. Installing behind-the-meter batteries across the estate did little to increase self-consumption, and while this improved with a front-of-meter (shared) battery, the lack of constraints on grid supply capacity to 2050 was unlikely to support a business case for large scale storage.

While investment opportunities seem to be limited, the project has provided genuine insight into the data landscape and approaches to detailed energy modelling on non-domestic sites. The analysis can be applied elsewhere, including the other 125 industrial estates in Devon. Local energy planning and policy initiatives can also benefit from the analysis and the Centre has met with NESO representatives to discuss implications for the development of the Regional Energy Strategic Plan (RESP).

Transport

Emissions From Road Use, Construction and Haulage

The Centre is undertaking a range of activities relating to the transport sector, including embodied and operational emissions of roads, transport planning, haulage analysis, and adaptation.

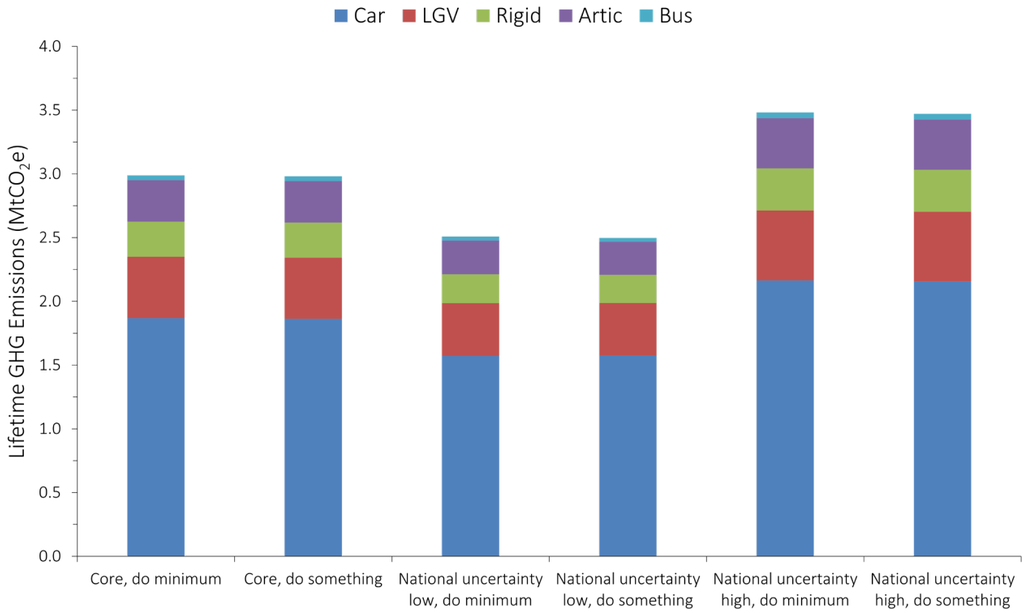
The Centre has been working with Devon County Council (DCC) for several years on the carbon impact of its road network. This has included the creation of a tool for transport engineers to estimate impacts of construction and maintenance jobs on the road network. Working with DCC and developers, the Centre is also producing a capture tool for live site data, and is co-authoring national sector standards (a Carbon Calculation and Accounting Standard) with the Future Highways Research Group (FHRG).

Meanwhile at the A382 near Newton Abbot, the Centre is working with the DCC transport team and its framework contractor M Group Highways in the design and delivery of a 'carbon negative' road in a project funded by the Department for Transport (DfT). This work involves producing highly granular models covering the whole lifecycle of the scheme, broken down by individual bill elements. The analysis assesses the impact of roughly 100 carbon reduction measures, covering design changes, installations, materials, construction methods, biodiversity, operation, and offsetting.

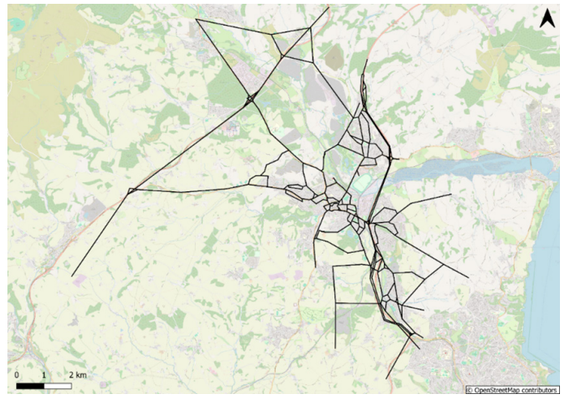
Alongside this, the Centre has worked with DCC to calculate the greenhouse gas emissions associated with road traffic along the A382 for a range of scenarios, both with the new road scheme, and with the existing road network unchanged.

DCC has supplied traffic flow models to support these scenarios, and calculations combining traffic flow with projections for fleet composition and vehicle efficiencies were carried out to establish changes in annual emissions associated with the traffic over a 60 year period. The financial impacts were also investigated using web-based transport analysis guidance (WebTAG) tools from the DfT.

Work is also ongoing with DCC to assess the impact of climate change on roads and bridges in its network.



Greenhouse gas emissions over 60 years for the 'do minimum' and 'do something' scenarios for a range of vehicles.



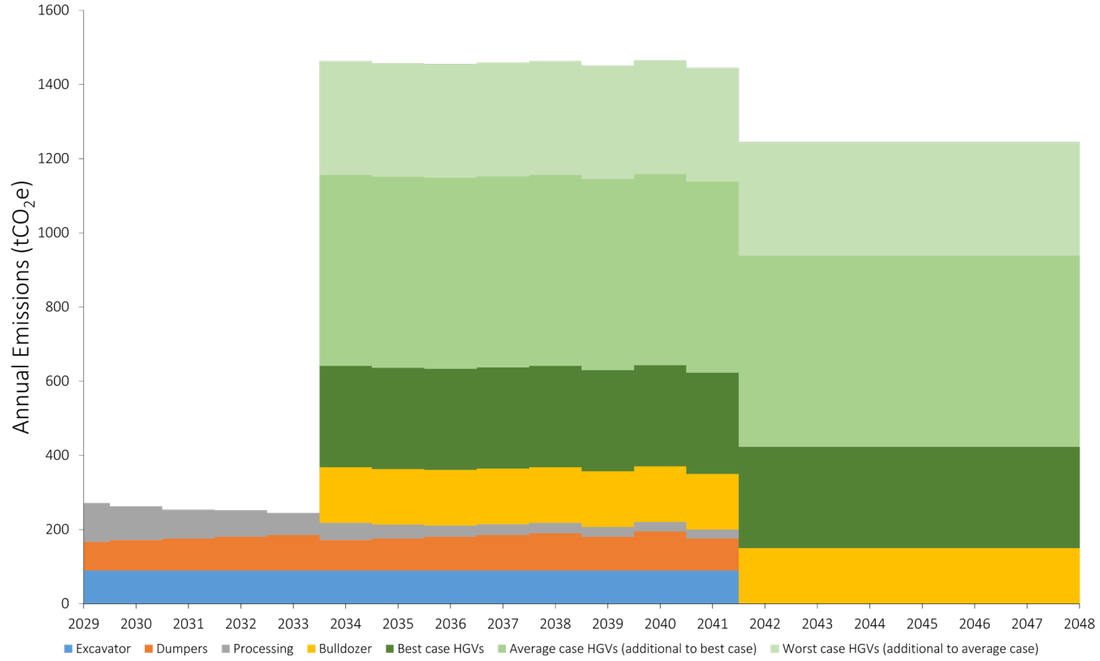
Modelled network map for the A382 Major Road Network Improvement Project.

Transport work this year has included working with a building materials and aggregate supplier to assess greenhouse gas emissions associated with expanding operations at a quarry. Building on previous work that considered emissions from mineral extraction and processing, the project was expanded to include options for restoration of the site involving the import of a significant amount of inert waste.

GIS analysis was undertaken to establish waste haulage emissions from a number of construction sites as well as a comparison with emissions for different HGV scenarios and alternative disposal routes, including existing and proposed inert waste sites in the region.

The quarry restoration option, and in particular the haulage of waste to the site, did result in significantly higher emissions than the modelled alternatives, although the extent was dependant on the source of the waste.

Other transport projects include work with Plymouth City Council to disaggregate transport emissions by vehicle type and to project emissions to 2050. The project was particularly focussed on charging infrastructure and the pace of electrification. While considering diversity in vehicle charging times for different groups, the project assessed how electricity supply constraints might arise over time. Guided by Climate Change Committee assumptions and trajectories in the Seventh Carbon Budget, this work contributed to the preliminary stages of the development of a net zero route map for Plymouth.



Annual GHG emissions from a quarrying site over a period of 20 years, including three scenarios for HGVs, covering the extraction and subsequent restoration by infilling with inert waste.

Adaptation

Adapatation and Resilience to Climate Change

With the impacts of climate change becoming more apparent, the Centre's work on adaptation continues to grow, assisting local authorities to consider their responses to these new challenges.

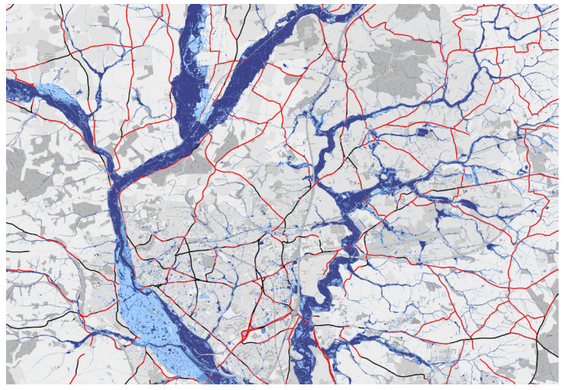
Previous work on adaptation has involved producing guidance for the Exeter City Council Local Plan. Similar adaptation policies elsewhere were reviewed to assess their scope and efficacy, and to see where there might be synergies with the emerging policy in Exeter.

Background material developed for the policy includes holistic measures to reduce overheating in buildings, including orientation, air-tightness, passive ventilation, shading, use of reflective surfaces, green infrastructure, and provision of heat refuges. Flood risk is addressed by green roofs, permeable pavements, rainwater harvesting and a range of property-based interventions to aid recovery following flooding (barriers and covers, waterproof coatings, raised sockets and separating electrical circuits). Advice on adapting to reduced water availability is also provided. Renewable energy technologies have benefits for adaptation, including improved energy security and resilience, and within the City focused on roof mounted solar photovoltaic panels. Options for improving biodiversity in the built environment through green roofs and soft landscaping were also included.

The Centre has been tasked with developing indicators for monitoring progress on adaptation against the 2023 Climate Adaptation Strategy (CAS) for Devon, Cornwall, and the Isles of Scilly (DCIoS) and the associated Risk Register.

The availability and quality of data was assessed for each sector, making use of existing centrally maintained datasets wherever possible. Sectors in the DCIoS Risk Register were also aligned to those used by the Committee on Climate Change (CCC) in their progress reports to parliament, to enable benchmarking against national trends.

Where quantitative data was lacking, alternative sources of qualitative data were proposed and each indicator was given a 'Red-Amber-Green' (RAG) rating reflecting the confidence in the source and its relevance to the target. An additional 'orange' rating



Adaptation strategies are critical to minimise potential disruption on the Devon road network (shown in red) where there is an increased risk of flooding (shown in blue).

was included where relevant data was not available directly, but there was scope to develop an indicator through proxy data or additional processing (e.g. by using GIS or other calculation software).

Overall, 112 indicators were assessed, 28% of which made use of publicly available data, 21% required data requests to be made, and 30% used proxy data or required further processing. The remaining 21% had insufficient sources of data which highlights the need for better monitoring of progress in adaptation.

Adaptation was also the subject of a successful funding application to DARe (the National Hub for Decarbonised, Adaptable, and Resilient Transport Infrastructures) for a large research project to address the resilience of Devon County Council (DCC) highways. By collating asset information (bridges and roads) with climate projections, the project aims to explore adaptation plans, interventions and priorities. Direct impacts (e.g. maintenance) will be considered alongside wider societal impacts (e.g. road closures) to demonstrate value to the public, local businesses and other stakeholders, including the council, highway engineers and politicians.

DARe is Funded by UK Research and Innovation (UKRI) and the Department for Transport.

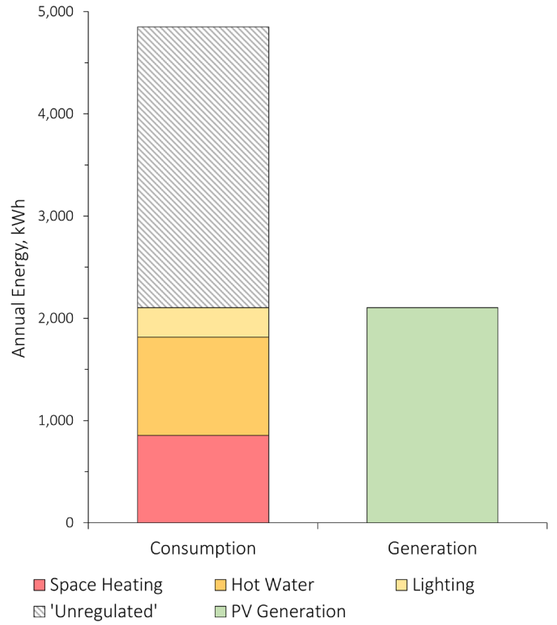
Planning

Local Plan Advice and Wider Planning Support

The Centre works with Local Authorities to produce evidence and guidance to support the development and examination of local plan documents. This involves technical analysis, reports and summaries for a non-expert audience.

The Centre provided technical analysis to support the Torbay Council proposal for a Net Zero Carbon Development policy, derived from its updated Local Plan (2022–2040). The policy requires that new development achieves 'net zero', with the definition covering regulated emissions over a year of operation. Regulated emissions include those from space heating, hot water and lighting but not from appliances (for example).

A new building with an electric heat pump and roof mounted solar photovoltaic (PV) panels meets the requirement where annual generation matches regulated energy consumption (as shown below). The energy performance of new dwellings is calculated using the SAP methodology, but is due to be replaced by the Home Energy Model (HEM) that will support the forthcoming Future Home Standard regulations.



Definition of 'net zero' for new dwellings in Torbay. On-site electricity generation from PV balances regulated energy consumption, though not unregulated energy (grey).

The HEM method was not available at the time, but the impact of the policy was assessed by considering five dwelling archetypes. Regulated energy demand was modelled along with PV capacities sufficient to satisfy the standard under a range of shading scenarios. Costs over and above the incoming regulations were also established. The modelling demonstrated that it would be possible to meet the policy for all the housing archetypes, as long as the shading was not too severe. For apartments, it was not possible to meet the policy with roof mounted PV due to the availability of roof space.

Impacts on the Torbay Council embodied policy, including costs, were also estimated. This policy requires new developments to undertake an embodied carbon assessment which considers emissions arising from materials and construction.

The Centre also supports Local Area Energy Plan (LAEP) development in Cornwall and Devon, a process that has proved to be technically challenging, costly and time consuming for many authorities. Quality assurance and technical input was provided for the Cornwall LAEP and some of the outputs are being refined with a view to developing further action plans.

In Devon, the Centre has contributed to Energy Planning Group meetings which have explored options for producing a Devon LAEP. Funding from the South West Net Zero Hub allowed the LAEP to progress through Stages 1–3 of a 7-stage process with the help of external consultants and the Centre has provided feedback on those outputs.

Advice on energy modelling, including tools and other support is anticipated to arise from the NESO Regional Energy Strategic Plan (RESP) methodology, and while the RESP will not replace LAEPs there is considerable overlap in terms of energy modelling. The Centre has met with the South West Regional RESP team to discuss options for modelling energy at the high temporal and spatial resolutions anticipated by Ofgem and has highlighted problems with capacity and connections that authorities face.

Targets and Offsets

Offsetting and Insetting for Residual Emissions

The Centre has worked with SWEEG partners to consider the most suitable ways of mitigating residual emissions, those that remain once all other viable carbon reduction measures have been implemented.

Voluntary carbon markets are anticipated to grow as key net zero milestones are approached but could evolve into a high-integrity, high-price market or one with low-cost offsets of questionable provenance. The reputational and delivery risks associated with offsetting can be minimised by targeting emissions reduction and supporting local offsetting schemes.

The Centre has worked with Cornwall Council and the University of Exeter to establish Science Based Targets (SBTs) following the detailed requirements of the SBT initiative.

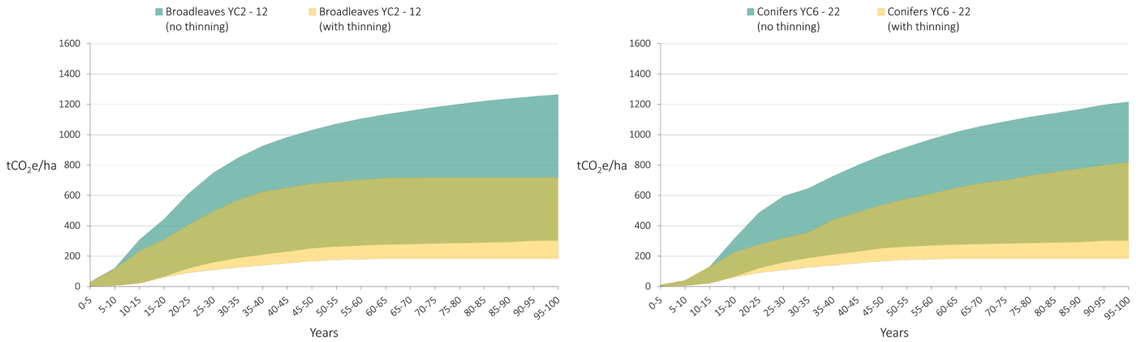
At the University of Exeter, the Centre provided an assessment of external advice given on 'insetting', where carbon credits are purchased from actions which reduce emissions within University supply chains or where carbon impacts occur in the local area.

Cornwall Council's commitment to carbon neutrality is ambitious but will require some use of carbon offsets. Working with the Centre, a series of quality criteria were developed to minimise delivery risks associated with offsetting schemes and to promote local benefits.

The standard for declarations of carbon neutrality requires that all reasonable measures for emissions reduction within the boundary are undertaken before offsetting. The subsequent purchase of carbon credits must be from accredited schemes where measures result in quantifiable and permanent reductions in GHG emissions. Importantly all offset schemes must demonstrate the principle of additionality by demonstrating that they go beyond regulatory requirements and could not have happened without funding made available by selling carbon credits.

In Cornwall, schemes involving peat and blue carbon are limited due to the small number of sites. Biochar opportunities are constrained by the availability of raw materials and complications with demonstrating real and permanent reductions. Increases in soil carbon sequestration from improved land management are similarly difficult to quantify. The standard often used to generate credits from energy efficiency retrofit in homes (Verra VM0008) disappointingly allows the like-for-like replacement of gas boilers which could lock in fossil fuel emissions for 20 years and hamper the roll out of heat pumps.

The Woodland Carbon Code is perhaps the most established offsetting scheme in the UK and includes processes for validation and verification, and mechanisms to mitigate losses from individual project failure. Woodland creation and restoration also provides numerous co-benefits to the local area. Anticipated sequestration rates are nonlinear and are modelled using tools developed by Forest Research (see below). Planting at rates to meet targets for 2030 and 2040 could therefore yield a surplus of credits which could increase in value over time.



Carbon sequestration as modelled in the Woodland Carbon Code for broadleaf woodlands (left) and conifers (right). The effect of different yield classes and management styles including thinning (yellow) and no thinning (green) are shown.

Publications

List of Publications

Documents produced by the Centre this year.

Internal documents

Number	Title	Author(s)
1072	An assessment of energy supply to the extension of the Hartnolls Business Centre from the Red Linhay/Hartnoll Farm AD plant	A Norton
1073	The estimated electrical power output from the permitted quantities of feedstock supplying the Red Linhay anaerobic digester	A Rowson
1074	Calculations of Greenhouse Gas emissions from Road Users for the A382 Major Road Network Improvements Project: Further Updated Traffic Models February 2025	D Lash
1075	South Hams District Council's Organisational Carbon Footprint 2023/24	E Feaver, D Lash
1076	West Devon Borough Council's Organisational Carbon Footprint 2023/24	E Feaver, D Lash
1077	Heathfield industrial estate decarbonisation - Energy demand and GHG gas emissions	I Brown, E Feaver, A Norton, A Rowson
1078	Greenhouse Gas Inventory for Cornwall and the Isles of Scilly, 2022	A Norton, R Rubia Rankin
1079	Heathfield Industrial Estate Decarbonisation - Energy and decarbonisation modelling	I Brown, E Feaver, A Norton, A Rowson
1080	Greenhouse Gas Inventories for SWEEG Supplement: Marine and Aviation Emissions	R Rubia Rankin
1081	Plymouth's greenhouse gas sector emissions monitoring 2024	A Norton, R Rubia Rankin, A Rowson
1082	Carbon Offsetting Options for Cornwall Council	A Rowson, D Lash
1083	Embodied Carbon of Plymouth's Guildhall Energy Centre	D Lash
1084	Heathfield Industrial Estate Decarbonisation - Energy system opportunities	I Brown, E Feaver, A Norton, A Rowson
1085	Deriving a Science Based Target for Cornwall Council	D Lash
1086	East Devon District Council's Carbon Footprint 2024/25	D Lash
1087	Mid Devon District Council's Organisational Carbon Footprint 2024/25	D Lash
1088	Estimating Cost Uplifts of Torbay Council's Net Zero Carbon Development Policy	D Lash
1089	Delivering Torbay Council's Embodied Carbon Policy	D Lash
1090	Mapping Devon's industrial estates	E Feaver, A Norton
1091	Avon and Somerset Police's Carbon Footprint 2024/5	D Lash
1092	Devon and Cornwall Police's Carbon Footprint 2024/5	D Lash
1093	Dorset Police's Carbon Footprint 2024/5	D Lash
1094	Gloucestershire Police's Carbon Footprint 2024/5	D Lash
1095	Wiltshire Police's Carbon Footprint 2024/5	D Lash
1096	Plymouth's greenhouse gas reporting 2025	A Norton, R Rubia Rankin
1097	An emissions-based analysis of transport and vehicle charging in Plymouth	I Brown
1098	Monitoring adaptation to climate change in Devon, Cornwall and the Isles of Scilly: data availability assessment	I Brown, R Rubia Rankin

Briefing papers

Number	Title	Author(s)
111	Postage Climate Impact	R Rubia Rankin, A Norton

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